

PATENT SPECIFICATION

(11)

1 475 004

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- (21) Application No. 44260/74 (22) Filed 11 Oct. 1974
 (31) Convention Application No. 412 117 (32) Filed 2 Nov. 1973 in
 (33) United States of America (US)
 (44) Complete Specification published 1 June 1977
 (51) INT. CL.² A61L 9/04
 (52) Index at acceptance
 ASG 12 5J
 (72) Inventor LUCIUS D. WATKINS



(54) VAPOUR DISSEMINATING DEVICE

(71) We, PERMTEK, INC., a Body Corporate organised under the laws of the State of Florida, United States of America, of P.O. Box 413, Naples, Florida, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to vapour disseminating devices and particularly devices for dispensing, as a vapour, active volatile liquids, such as insecticides, odorants, deodorants, repellents, and attractants. The invention also relates to dispersing of such substances into the atmosphere through flexible thermo-plastics material which is permeable to the substance to be dispensed.

According to the invention there is provided a device for controllably dispensing a volatile liquid as a vapour, said device comprising a housing including means defining an airtight chamber, a sealed envelope located in said chamber and containing the liquid to be dispensed, said envelope including a wall through which the liquid is permeable, and valve means operable between open and closed positions for controlling air flow relative to said chamber.

The device may include a motorized fan for causing air flow through said chamber subject to the position of said valve means, and means which provide coordinated operation of said fan and of said valve.

The device may comprise outlet means communicating between said airtight chamber and the atmosphere, the aforesaid valve means including a first valve controlling air flow through said outlet means and operable between open and closed positions, inlet means communicating between the atmosphere and said airtight chamber, the aforesaid valve means also including a

second valve controlling air flow through said inlet means and operable between open and closed positions, and means for coordinated opening and closing of said first and second valves.

According to one embodiment of the invention the device comprises a cartridge located in said airtight chamber and including said sealed envelope containing the flowable substance to be dispensed and formed of two plies of plastics material permeable to the volatile liquid, each of said plies including a substantially identical series of internested corrugations, said envelope including portions overlaid relative to each other, said cartridge further including a spacer interleaved between said overlaid portions, outlet means communicating between said chamber and the atmosphere, inlet means communicating between the atmosphere and said chamber, said valve means controlling air flow through said inlet means and outlet means, and motorized means for impelling air into the chamber.

The following is a more detailed description of one embodiment of the invention, reference being made to the accompanying drawings in which:—

Figure 1 is a partially schematic vertical section through a dispensing device in accordance with the invention.

Figure 2 is a front view of the device shown in Figure 1.

Figure 3 is a rear view of the device shown in Figure 1.

Figure 4 is a sectional view taken along line 4-4 of Figure 1.

Figure 5 is a sectional view taken along line 5-5 of Figure 1.

Before explaining the invention in detail, it is to be understood that the invention is not limited in its application to the details of the construction and arrangement of parts set forth in the following general de-

SPECIFICATION NO 1475004

By a direction given under Section 17 (1) of the Patents Act 1949 this application proceeded in the name of WILL ROSS, INC., a Corporation organised under the laws of the State of Delaware, United States of America, of 2727 West Good Hope Road, Milwaukee, Wisconsin 53209, United States of America.

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second valve controlling air flow through said inlet means and operable between open and closed positions, and means for co-ordinated opening and closing of said first and second valves.

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The following is a more detailed description of one embodiment of the invention, reference being made to the accompanying drawings in which:—

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Figure 5 is a sectional view taken along line 5-5 of Figure 1.

Before explaining the invention in detail, it is to be understood that the invention is not limited in its application to the details of the construction and arrangement of parts set forth in the following general de-

scription or illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practised or carried out in various ways.

- 5 Shown in the drawings is a device or dispenser 11 for controllably dispensing, as a vapour, an active volatile liquid which can be a repellent, an attractant, an odorant, a deodorant, an insecticide, or other like substance which is permeant to plastics material, as disclosed in co-pending application No. 1562/74 Serial No. 1 456 881 and co-pending application No. 44261/74, Serial No. 1 460 539, of even date herewith.
- 10 The device 11 includes a housing 13 comprising a tubular outer wall 15 and an interior intermediate or transverse base wall 17 which is fixed to the tubular outer wall 15 and divides the housing 13 into a forward compartment 19 and a rear compartment 21 and which includes therein one or more openings 23 (see Fig. 4) adjacent to the outer tubular wall 15 to permit air flow from the rear compartment 21 to the forward compartment 19, as will hereinafter be referred to.

The front end or the control and dispensing end of the housing 13 is closed by a front outer or end wall 25 which partially telescopically fits into the adjacent end of the tubular outer wall 15. In addition, the front end wall 25 includes a series of openings which constitute a grille 27 through which the active substance is dispensed.

- 30 The other end of the housing 13 is closed by a rear outer or end wall 31 which is partially telescopically received in the adjacent end of the tubular outer wall 15 and which includes a central access opening 33 through which a can or container 35 (including the substance to be dispensed) can be inserted into the rear housing compartment 21 between the intermediate or base wall 17 and the rear end wall 31.

- 40 The central access opening 33 in the rear end wall 31 is closed by a rear access cover 37 which, together with the rear end wall 31, includes bayonet type locking means 34 (see Fig. 3) for releasably retaining the access cover 37 in assembled relation to the rear end wall 31.

- Formed on the rearwardly facing surface of the access cover 37 (see Fig. 3) is a rearwardly extending cylindrical wall 41 from which project two diametrically opposed, oppositely extending flanges 43 and 45. The inner surface of the cylindrical wall 41 and the flanges 43 and 45 provide a recess for storing an electrical cord 47 associated with an electrical motor 49 (see Fig. 1) still to be described.

- The rearward end of the housing 13 is also provided with air entry means. Such air entry means can comprise one or more openings in the tubular outer housing wall

13 or in the rear end wall 31. In the illustrated construction, such air entry means is provided by one or more openings 51 in the access cover 37.

The end walls 25 and 31 can be retained in assembled relation to the outer tubular wall 15 and base or inner wall 17 in various ways. In the illustrated construction, a plurality of angularly spaced tie rods 53 (see Fig. 1) extend between the end walls 25 and 31 and through the base or inner wall 17 to releasably retain the housing 13 in assembled relation. In particular, the tie rods 53 extend into nuts 55 imbedded in bosses 57 on the interior surface of the front end wall 25 and extend through nuts 59 located on the exterior side of the rear end wall 31.

Extending forwardly from the access cover 37 (see Figs. 1 and 5) are a plurality of angularly spaced fingers or pilots engaging the can or container 35 which includes a coiled cartridge 63 as generally disclosed in above-mentioned co-pending application No. 44261/74 Serial No. 1 460 539. The container or can 35 can be fabricated of plastics or metal which is not permeable to the substance to be dispensed and which is non-apertured except for an open mouth 64 (see Fig. 1) coverable by a cap (not shown). When assembled in the housing 13, the free or open end or mouth of the can or container 35 engages a gasket 65 supported on the base or inner wall 17. Engagement of the can or container 35 against the gasket 65 in airtight relationship to provide a sealed, airtight chamber 71 is afforded by a spring 73 located between the access cover 37 and a bottom or transverse wall 75 of the can or container 35.

In addition to the fingers 61 which extend from the access cover 37 to properly locate the can or container 35 in the rear housing compartment 21, a plurality of angularly spaced fingers or guides 81 also extend rearwardly from the base or inner wall 17 for engagement with the outer surface of the container 35 near the open end 64 so as to assist in properly locating the open end 64 of the can or container 35 in engagement with the gasket 65 on the intermediate or base wall 17.

Within the perimeter of the gasket 65, the base or inner wall 17 is non-apertured except for valve controlled inlet and outlet means which afford communication with the otherwise airtight chamber 71 formed by the container 35 and the base or inner wall 17. The inlet means includes an inlet port or opening 83 located centrally of the base or inner wall 17, and the outlet means includes an outlet port or opening 85 located in the base or inner wall 17 in spaced relation below the inlet opening 83.

Rotatable relative to the base or inner

5 wall 17 and relative to the inlet and outlet openings 83 and 85 is a shutter 91 mounted on a shutter shaft 93 for axial movement relative thereto and for common rotation therewith. The shutter shaft 93 is journaled, adjacent its ends, by the base or inner wall 17 and by the front end wall 25. Overlying the shutter 91 is a plate 95 having a central opening 97 through which the shutter shaft 93 passes. The plate 95 also includes extensions 99 engaged by guides or studs 101 which extend from the base or inner wall 17 and which prevent rotation of the plate 95 relative to the base or inner wall 17 while permitting movement of the plate 95 in the axial direction of the shutter shaft 93. Accordingly, the shutter 91 is rotatable relative to and between the base or inner wall 17 and the plate 95, and the plate 95 and shutter 91 are movable axially of the shutter shaft 93 relative to the base or inner wall 17.

25 Formed in the plate 95 is an outlet port 105 which generally registers with the outlet opening 85 in the base or inner wall 17 and which can take various forms and, in the illustrated construction is in the form of a right triangle having one side extending radially from the shutter axis and having an apex 107 which points radially outwardly. Provided on the outer surface of the plate 95 is a nipple 109 which surrounds the outlet port 105 and which is connected to a flexible tube or conduit 111.

35 Also formed in the plate 95 is an inlet port 115 located in generally diametrically opposite relation from the inlet port 105 and in registry with the inlet opening 83 in the base or inner wall 17.

40 The shutter 91 is formed to cooperate with the plate 95 and inner wall 17 to provide inlet and outlet valve means controlling flow to and from the sealed chamber 71. In this regard, the shutter 91 includes an arcuate inlet slot 121 which is radially located so as to move into and out of communication with the outlet opening 85 in the wall 17 and with the outlet port 105 of the plate 95 in response to shutter rotation. 50 The shutter 91 also includes an arcuately extending outlet slot 123 having an outer arcuate edge 125 spaced from the axis of shutter rotation at a constant radius which is substantially equal to the distance from the shutter axis to the apex 107 of the outlet port 105. The other side edge 127 spirals inwardly from a point of juncture with the outer edge 125 and the slot 123 extends circumferentially for about 130 degrees.

65 The inlet slot 121 is located relative to the outlet slot 123 so that in response to turning of the shutter 91 in a clockwise direction (as seen in Fig. 4) from a closed position, the inlet slot 121 initially comes

into at least partial registry with the inlet port 115 and inlet opening 83 prior to any registry of the outlet slot 123 with the outlet port 105 in the plate 95. As the shutter movement in the clockwise direction progresses, the inlet slot 121 comes promptly into full registration with the inlet port 115 and the inlet opening 83, and the movement of the shutter 91 past the outlet port 123 serves to progressively increase the effective opening of the outlet port 123 in the plate 95.

At its outer end, the shutter shaft 93 is provided with a combination pointer and handle 131 which pivots with the shutter shaft 93 relative to indicia 135 on the front end wall 25 so as to inform the operator when the shutter 91 is in a closed position, i.e., with both the inlet and outlet means closed, and to inform the operator of the degree to which the outlet means is open.

In order to maintain the airtightness of the chamber 71, means are provided for biasing the plate 95 against the shutter 91 and for biasing the plate 95 and shutter 91 against the base or inner wall 17. While various arrangements can be employed, in the illustrated construction, such means comprises a helical spring 141 which surrounds the shutter shaft 93 and, at one end, bears against the plate 95 and, at the other end, bears against the front end wall 25.

Located between the base or inner wall 17 and the front end wall 25 is an assembly 151 including the electric motor 49 and a fan 153, both of which are mounted in a shroud 155 which, in turn, is supported by resilient mounts 157 from each of the front end wall 25 and the inner wall 17. While various motors can be employed, in the illustrated construction, the motor 49 is a substantially constant speed motor which drives the fan 153. While various fans can be employed, in the illustrated construction, the fan 153 is of the centrifugal type.

The shroud 155 includes a flow inlet 161 communicating with an air duct or passage 165 which includes therein a relatively restricted opening 167 communicating with the interior of the forward housing compartment 19, and which terminates in a nipple 169 to which the other end of the tube or conduit 111 is attached. The shroud 155 is formed to convey air from the air duct or passage 165 to the fan 153 and to convey air delivered by the fan 153 past the motor 49 and out through the grille 27.

The before-mentioned coiled cartridge 63, included in the can or container 35, comprises a sealed corrugated package or envelope 201 (see Fig. 5) which contains the active volatile liquid to be dispensed and which is formed of plastics material permeable to the liquid. The cartridge 201 also includes a spacer 203 which is inter-

leaved between the coils or layers of the corrugated package 201 to prevent nesting or meshing thereof and thereby to provide, between the corrugations, passages 205 affording maximum area for air flow parallel to the corrugations and for evaporation of the liquid which permeates through the plastics material.

In order to form a central tube 211 to conduct incoming air from the inlet opening 83 to the rear or bottom of the container 35, the spacer 203 is initially rolled or coiled upon itself one of more times to form the central tube 211. After formation of the central tube 211, the corrugated package 201 is then rolled up with the spacer 203 between successive spacer coils.

In order to retain the tube 211 in proper location in the container 35, the bottom or rear wall 75 of the container 35 is provided with a plurality of angularly spaced fingers 215 which project into the rear end of the tube 211 to properly locate the tube 211 while permitting flow from the rear end of the tube 211 radially outwardly adjacent to the bottom wall 75 of the container 35. In order to provide a rear plenum or air passage 217 communicating with the rear end of the tube 211 and at the bottom wall 75 of the container 35, one or more arcuately spaced and radially extending ridges or shoulders 219 are provided, whereby to space the rear end of the cartridge 63 from the bottom wall 75.

In order to insure that essentially all of the air flowing through the inlet opening 83 travels axially of the tube 211 toward the rear end thereof, there is provided, around the inlet opening, a gasket 225 which is engaged by the forward end of the tube 211 when the container 35 including the cartridge 63 is placed in the rear housing compartment 21. Thus, entering air flows axially to the rear of the tube 211, then flows radially outwardly adjacent the bottom wall 75 of the container 35, and then axially forward in the passages 205 between the spacer 203 and the corrugated package 201 into a forward plenum 231 which is formed at the forward end of the cartridge 63 between the cartridge 63 and the base or inner wall 17 and between the gaskets 65 and 225, and which communicates with the outlet opening 85 in the wall 17. Of course, cartridges other than the specifically described cartridge 63 can be employed. However, it is preferred that the cartridge be generally constructed in accordance with the disclosure of above-mentioned co-pending application No. 44261/74 Serial No. 1 460 539.

As already indicated, when the valve means are closed, the engagement of the container 35 against the gasket 65 provides the sealed chamber in which the cartridge

63 is contained. Dispersion through the plastics material of the package or envelope 201 will cease when the air trapped in the container 35 is saturated. Furthermore, under normal circumstances, the air in the container 35 is always saturated with the active substance.

The container 35 is adapted to be stored without loss of the active substance to be dispensed prior to placement in the housing 13 by covering the open end 64 of the container with a plastics cap which is impermeable to the active substance to be dispensed and which is removed immediately prior to insertion of the container 35 into the housing 13.

Located adjacent the shutter 91 is an electric reel switch 241 which controls operation of the motor 49 and which is located in position for actuation by a projection 243 which includes a magnet and which is located on the shutter 91 in position to turn "on" the electric motor 49 in response to shutter movement from the closed position and to turn "off" the electric motor in response to shutter movement to the closed position.

In operation, rotation of the shutter shaft 93 in a clockwise direction from the closed position serves initially to turn on the motor 49 and simultaneously to bring the inlet slot 121 in the shutter 91 into registry with the inlet port 115 in the plate 95 and with the inlet opening 83 in the wall 17. Immediately thereafter, the outlet slot 123 begins to register with the outlet port 105 in the plate 95 and with the outlet opening 85 in the wall 17.

Operation of the fan 153 draws a suction through the opening 167 in the air passage 165 and through the tube or conduit 111, drawing air saturated with the active substance from the sealed chamber 71, which saturated air is mixed with air entering the air passage 165 through the opening 167. Such air is delivered by the fan past the motor and out of the housing through the grille 27.

Flow of air from the sealed chamber 71 induces inflow of air through the inlet port 115 and inlet opening 83 for travel rearwardly in the tube 211, radially outwardly at the rear plenum 217 in the container 35, and then forwardly through the passages 205 in the cartridge 63, and thereby to evaporate the active substance from the package walls, and finally to the forward plenum 213 and out through the outlet opening 85 and outlet port 123.

When the shutter shaft 93 is rotated further in the clockwise direction (as seen in Figure 4) the amount of the outlet slot 123 in registry with the outlet port 105 in the plate 95 increases, thereby permitting increased flow. The surface area of the car-

tridge 63 is such that, even at maximum air flow, the air travelling through the chamber 71 will always be saturated with the active substance in vapour form. Consequently, the amount of substance being dispensed is directly proportional to the air flow from the chamber, which flow is controlled by the shutter 91, as affected by the constant speed motor and the air opening 167 in the passage or duct 165 leading to the shroud 155. Thus, the shutter 91 provides a reliable arrangement for controlling the dispensing rate. In addition, because the maximum rate of output of the substance through the walls of the package 201 or cartridge 63 remains unaffected until the cartridge 63 is essentially empty, the shutter 91 provides efficient control throughout the life span of the cartridge 63.

Upon rotation of the shutter 91 to the closed position, the inlet and outlet means to the chamber 71 are closed, thereby sealing the chamber 71 against loss of the active substance, and the motor 47 is automatically turned off.

Any of the active substance which may be in the forward compartment 19 after closing of the valve means is exhausted from the housing 13 due to normal air movements occurring in the housing 13 because of convection, gravity, or otherwise. Specifically, air enters through the opening 51 in the access cover 37 and passes around the container 35 and through the openings 23 in the base or inner wall 17 to the forward compartment 19. The air then travels through the opening 167 into the air passage or duct 165 leading to the shroud 155 and finally out the grille 27. Thus, ventilation is provided through the device 11 in order to minimize the presence of residual vapour in the housing 13 when the shutter 91 is closed and the cartridge 63 is sealed in the chamber 71. During the dispensing operation, air flowing into the chamber 71 through the inlet opening 83 and air flowing through the opening 167 into the shroud 155 also enters the housing 13 through the air entry opening 51 in the rear access cover 37 and travels into the forward compartment 19 through the openings 23 in the base or inner wall 17.

WHAT WE CLAIM IS:—

1. A device for controllably dispensing a volatile liquid as a vapour, said device comprising a housing including means defining an airtight chamber, a sealed envelope located in said chamber and containing the liquid to be dispensed, said envelope including a wall through which the liquid is permeable, and valve means operable between open and closed positions for controlling air flow relative to said chamber.

2. A device according to claim 1 and including a motorized fan for causing air

flow through said chamber subject to the position of said valve means, and means which provide coordinated operation of said fan and of said valve means.

3. A device according to claim 2 and further including a fan shroud supported by said housing, a conduit communicating between said fan shroud and said valve means, and means for affording entry of air into said conduit between said valve means and said fan shroud.

4. A device according to any of claims 1 to 3 wherein said housing includes a fixed wall portion and wherein said means defining said airtight chamber comprise said wall portion and a removable container engaged in airtight engagement with said wall portion.

5. A device according to claim 4 and further including a gasket between said fixed wall portion and said container, and a spring urging said container against said gasket so as to maintain said container in airtight engagement with said wall portion.

6. A device according to claim 4 or claim 5 wherein said airtight chamber communicates with an inlet and an outlet, and said container includes a cartridge formed by said envelope and a central tube communicating with said inlet, and a gasket on said wall portion and engaged by said tube for ensuring travel through said tube of air entering into said chamber through said inlet.

7. A device according to claim 6 wherein said container includes a bottom wall spaced from said wall portion and further including means which spaces said cartridge from said bottom wall to provide a plenum adjacent said bottom wall for radially outward movement of air exiting from the adjacent end of said tube, and wherein said envelope includes spaced corrugations defining air passages affording flow of air from said plenum toward said wall portion, and wherein said gasket spaces said cartridge from said wall portion to define a second plenum communicating with said outlet.

8. A device according to claim 1 and comprising outlet means communicating between said airtight chamber and the atmosphere, the aforesaid valve means including a first valve controlling air flow through said outlet means and operable between open and closed positions, inlet means communicating between the atmosphere and said airtight chamber, the aforesaid valve means also including a second valve controlling air flow through said inlet means and operable between open and closed positions, and means for coordinated opening and closing of said first and second valves.

9. A device according to claim 8 and further including means for impelling air

into the chamber and wherein said means for coordinated opening and closing of said valves are also operable to control operation of said air impelling means in coordination with the opening and closing of said valves.

10. A device according to claim 8 or claim 9 wherein said envelope is formed of two plies of plastics material permeable to the liquid being dispensed, each of said plies including a substantially identical series of internested corrugations, said envelope including portions overlaid relative to each other, and a spacer interleaved between said overlaid portions.

11. A device according to any of claims 8 to 10 wherein said first and second valves are provided by a plate having inlet and outlet ports, and a shutter rotatable relative to said plate and including inlet and outlet slots movable relative to positions of registry with said inlet and outlet ports.

12. A device according to claim 11 wherein said housing includes an outer wall, wherein said means defining said airtight chamber include a fixed wall portion, a shaft rotatably journaled in said fixed wall portion and said outer wall, wherein said plate is fixed against rotation relative to said fixed wall portion, and wherein said fixed wall portion includes inlet and outlet openings communicating with said airtight chamber and in registry with said inlet and outlet ports in said plate, and wherein said shutter is mounted on said shaft for rotation therewith between said plate and said fixed wall portion.

13. A device according to claim 12 wherein said shutter is movable axially on said shaft, and said plate is movable axially of said shaft, and further including means biasing said plate against said shutter, and biasing said plate and said shutter against said fixed wall portion.

14. A device according to claim 9 wherein said means for impelling air into the chamber comprise a motorized fan, and further including a fan shroud supported by said housing, a conduit communicating between said fan shroud and said first valve, and means for affording entry of air into said conduit between said first valve and said fan shroud.

15. A device according to claim 8 wherein said airtight chamber is formed by

a fixed wall portion and a container engaged with said wall portion and including a cartridge formed by said envelope and including a central tube communicating with said inlet means, and a gasket on said wall portion and engaged by said tube for ensuring travel through said tube of air entering into said chamber through said inlet means.

16. A device according to claim 15 wherein said container includes a base spaced from said fixed wall portion and further including means for spacing said cartridge from said base to provide a plenum adjacent said base for radially outward movement of said air exiting from the adjacent end of said tube, and wherein said envelope includes spaced corrugations defining air passages affording flow of air from said plenum toward said wall portion, and wherein said gasket spaces said cartridge from said wall portion to define a second plenum communicating with said outlet means.

17. A device according to claim 1 and comprising a cartridge located in said airtight chamber and including said sealed envelope containing the liquid to be dispensed and formed of two plies of plastics material permeable to the liquid, each of said plies including a substantially identical series of internested corrugations, said envelope including portions overlaid relative to each other, said cartridge further including a spacer interleaved between said overlaid portions, outlet means communicating between said chamber and the atmosphere, inlet means communicating between the atmosphere and said chamber, said valve means controlling air flow through said inlet means and outlet means, and motorized means for impelling air into the chamber.

18. A device for controllably dispensing a volatile liquid, substantially as hereinbefore described with reference to the accompanying drawings.

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1 475004

COMPLETE SPECIFICATION

2 SHEETS

This drawing is a reproduction of
the Original on a reduced scale.

SHEET 1

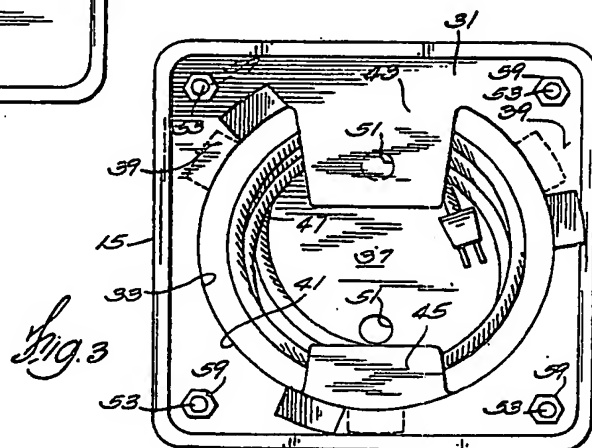
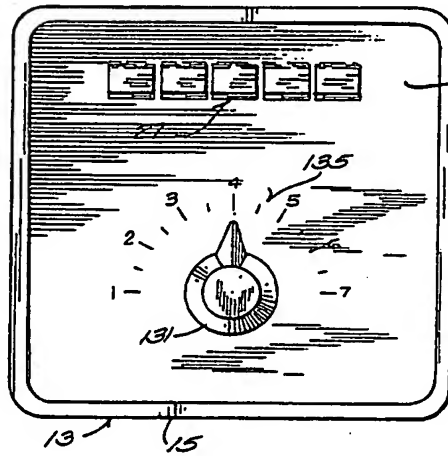
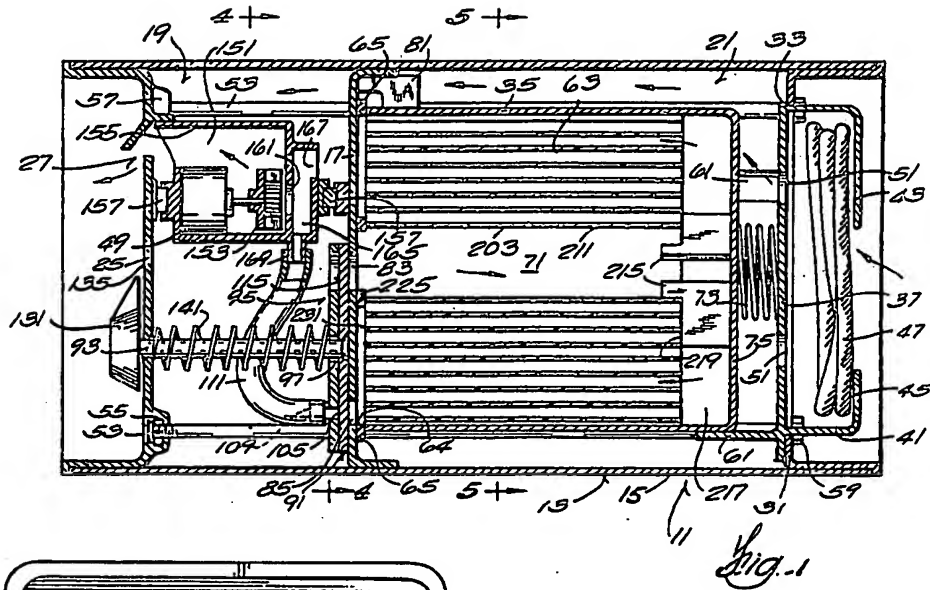


Fig 4

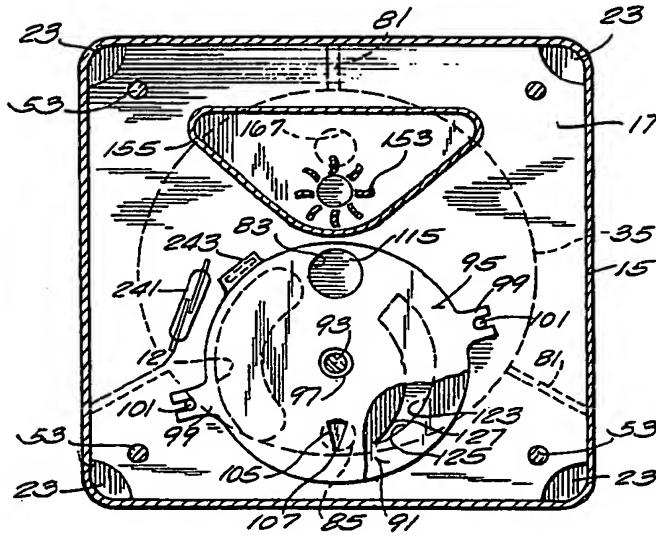


Fig 5

